

# **ABSTRACT**

The present invention relates to a system for detection and identification of airborne biological, chemical and/or nuclear threats such as toxins, spores, bacteria, and viruses in real time at distances from a few meters to several kilometers. Compact femtosecond terawatt laser technology is combined with spectroscopic and mathematical methods for spectral sensing of airborne warfare agents such as bio-aerosols. Trigger sensors and standoff devices based on mobile terawatt femtosecond laser systems are provided that may be placed at strategic monitoring locations. Furthermore, the invention relates to the propagation of airborne ultra-short, ultra-intense laser pulses giving rise to plasma channels (filamentation) producing white light supercontinuum ranging from the ultraviolet (UV), visible (VIS), near infra-red (NIR) and middle infra-red (MIR). According to this invention, the supercontinuum can be directly produced in a particle cloud and hence is uniquely suitable for multi-spectral long-range atmospheric agent and radioactive isotope detection.